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March 22, 2002

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
445 12th St., N.W.
Washington, D.C. 20554

Re: Ex Parte Submission
Establishment of Rules and Policies for Satellite Digital Audio Radio in the 2310-2360 MHz Band, IB Docket No. 95-91

Dear Mr. Caton:

BeamReach Networks, Inc. (BeamReach) hereby responds to the March 18, 2002 Ex Parte submission of Sirius Satellite Radio Inc. (Sirius) and XM Radio, Inc. (XM). In this submission, as they have in past submissions, the parties make inaccurate and misleading statements about the BeamReach system that is being developed to deliver Broadband Wireless Access services in the WCS band. We seek once again to correct the record on these matters.

BeamReach will experience interference from 40 kW SDARS repeaters

BeamReach has shown simulation results that show that up to 35% of potential BWA households would be blocked from using WCS service if the SDARS repeater configurations were allowed to operate at up to 20 kW. In a further analysis, using the repeater configuration submitted by XM and Sirius in the STA for the Atlanta metropolitan area, it was shown that a similar percentage of users would be blocked. [1] XM's proposed AGC would do little to mitigate interference beyond the protection afforded the current BeamReach CPE with its AGC circuit design. The only remedy is a reduction in the maximum EIRP allowed by SDARS repeaters to comply with the rules currently imposed on WCS licensees in the bands adjacent to the SDARS band.

BeamReach DOES employ RF AGC

XM and Sirius have claimed in their recent filing " the BeamReach equipment that Bell South may deploy does not include RF AGC."[2] This is simply not the case. In direct technical discussions with XM Radio, BeamReach has informed XM that RF AGC is employed in our current CPE design. XM has chosen to ignore this information and apparently intentionally misrepresent it in their submissions to the Commission.

AGC is implemented in the RF, IF, and baseband portions of the current BeamReach CPE design. This circuitry is designed to maximize system throughput, minimize interference in surrounding cells and into adjacent bands, and to reduce the sensitivity of the front end of the receiver in the presence of large signals, such as when a CPE is close to a base station. The design assumptions include the presence of other interfering signals, but not of a magnitude of up to 55 db (up to 300,000 times) of signal strength difference, as could be the case with a WCS signal and an SDARS HPR.

AGC in the CPE WILL NOT solve the problem

Throughout this process, XM and Sirius have repeatedly claimed that the implementation of RF AGC at the CPE will eliminate the problem by desensitizing the RF front end when exposed to the very high powered signals of the SDARS repeaters. Repeatedly, both in filings that are part of the record, and in direct appearances before the Commission, BeamReach has proven that this simple method WILL NOT solve the problem.[1],[3] While an RF AGC circuit will attenuate the SDARS signal sufficiently so that it would not cause brute force overload to the WCS receiver, any such AGC would also attenuate the WCS signal to such a negligible level that it could not be adequately received. This would force a WCS operator to shrink their cell radius and to deploy so many base stations that it would be uneconomical to offer BWA service in the WCS band.

In addition, XM suggests that filtering at the base station can eliminate the interference problem at the base station. BeamReach's base station has been designed to deliver broadband wireless access specifically in the WCS band, and it was required that high Q cavity filters be used at the base station in order to comply with the strict non-interference rules into the SDARS band. To meet this requirement, BeamReach already has employed High Q Cavity filters at its base stations. But the primary concern is the brute force overload interference that can overwhelm the CPE units, causing subscribers to be unable to receive the wireless broadband service being offered by WCS operators.

CPE filtering issue

In considering design parameters for its CPE design, BeamReach has considered the issue of filtering carefully. At the suggestion of the Commission, we have reexamined options for filtering elements that could potentially be added to the CPE that would filter out the damaging SDARS overload signals. [4] BeamReach has concluded this review and has reached the same conclusion documented in our previous filing . One of the manufacturers that we recently contacted, Lorch Microwave, who is experienced with Alumina filter designs indicated that "a filter built on alumina would have nowhere near the Q required for Bell South's application (filtering the C and D bands against up to 40 kW HPR in the SDARS band)." Lorch indicated that such a filter with these characteristics would cost up to $2000. [5]

In previous filings, BeamReach has described a filter that would partially filter damaging SDARS signals, but only in the A and B bands. However, this would only limit the problem not solve the problem. [6] First, this filter does not provide protection in the C

and D bands Second, at a total differential cost of $70 per CPE for the A or B band filter, the network is too costly to deploy.

ATT/XM test results

In addition, XM continues to quote the results of the "interference test" that was conducted in Houston as proof that interference will not occur for WCS receivers. This so-called repeater /ATT Angel co-existence test was either poorly conceived or intentionally designed to yield the desired result. The test geometry located a CPE across the street from its intended base station and in close proximity to a repeater. The base station to the CPE distance was between 400 and 800 ft. At this distance, the AGC of the CPE receiver attenuates its own base station signal significantly. As a by product, it will also attenuate the in-band repeater signal. However, had the intended base station been a modest distance away, such that the CPE receiver was working at its rated sensitivity, then severe overload would have resulted from the 5kW repeater.

A well-designed co-existence test would have defined the exclusion zones around the repeater for a statistically significant number of CPE. We note that a small percentage of CPE are close to their intended base station where RF AGC is effective in attenuating SDARs signals. For instance, if a BWA basestation has a reach of 5 miles, then 94% of the households are between 1.25 and 5 miles away. All of these receivers must be at or near full sensitivity to receive the base station signal. All of these CPE are susceptible to high power repeaters placed anywhere within this BWA footprint. This is the statistically significant case, not the one run by XM. In fact, the only co-existence case that works is the case tested by XM where the intended base station and repeater are equally distances such that either RF attenuation works or the receiver collects signals from both sources below the overload point.

This transparent argument is repeated in XM's ex parte filing of 3/5/02. Note that on page 10, "CPE Performance Analysis with RF AGC", that column 4, "SDARS Interfering Path Length" is always equal to or greater that column 3, "WCS Cell Size". These cases always work but represent a statistically insignificant percentage of the CPE. In fact, the design of this chart mimics the design of the co-existence test.

The XM HPR network is extensively over engineered

BeamReach also feels compelled to direct the Commission to an analysis completed and submitted to the Commission last September where BeamReach showed that the XM repeater network is over engineered and that the desired reception reliability could be achieved with a maximum EIRP of 2kW. [1] The analysis uses the technical parameters supplied by XM in their filings for receiver sensitivity (-99dbm) for their stated reliability targets, desired coverage reliability (99.99%), and the system gain afforded by the use of 2 kW maximum EIRP at the repeaters. Even with the conservative assumptions made in the analysis, it showed that XM could support its signal delivery goals using 0 dBi omni-directional receive antennas and the same repeater footprint it has currently proposed, but with a limit of 2 kW EIRP.

In addition, antenna range measurements of XM's receiver antenna reveal a simple solution to the WCS/SDAR compatibility problem. An XM Radio antenna was purchased, and its gain characteristics were measured. It reveals that XM employs a low gain monopole antenna for repeater reception. The monopole has a peak gain of 0 dBi falling off to –5 dBi on the horizon. By replacing this monopole with a small co-linear whip antenna, also an omni antenna, an extra 10 dB of gain is easily available. The co-linear whip coupled with a 2 kW repeater provides the same link budget as the current 20 kW design . All of this is available at an additional cost of less the $5 per antenna on the assumption that XM/Sirius still desire excessive signal margin.

Conclusion

The latest submission by XM and Sirius continues a long litany of misinformation that has been supplied to the Commission. It is hoped that the Commission will consider the technical corrections provided in this submission as the final rules are crafted for the coexistence of WCS broadband wireless access services and SDARS.

Sincerely,

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References

[1] **Ex Parte of September 7, 2001,** by BeamReach Networks, Inc., Verizon Wireless, Inc.
[2] **Letter from Bruce D. Jacobs and Carl R. Frank to William Canton,** dated by March 18, 2002.
[3] **Ex Parte of November 2, 2001, and its attachment of "Response to XM Radio's Supplement to August 29, 2001 White Paper",** by BeamReach Networks, Inc., BellSouth Corporation, Verizon Wireless, Inc., and WorldCom, Inc.
[4] **Ex Parte of February 28, 2002,** by BeamReach Networks, Inc., BellSouth Corporation, Verizon Wireless, Inc
[5] Private Communications with RF filter vendor, Lorch Microwave, March 2002.
[6] **Ex Parte of May 21, 2001,** by BeamReach Networks, Inc.